Rethinking peatland fire: Fire history of peatlands in the Great Lakes Region

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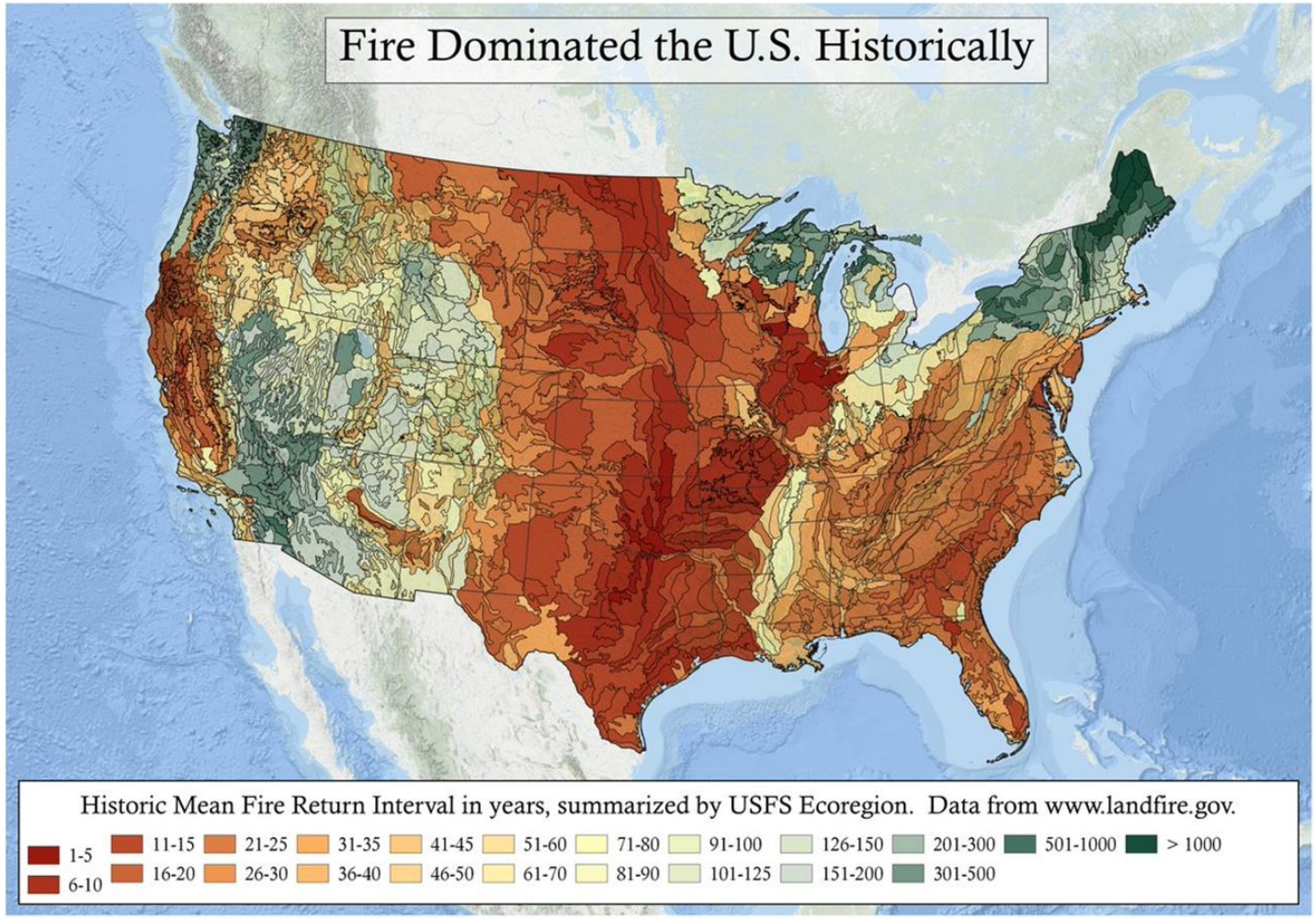
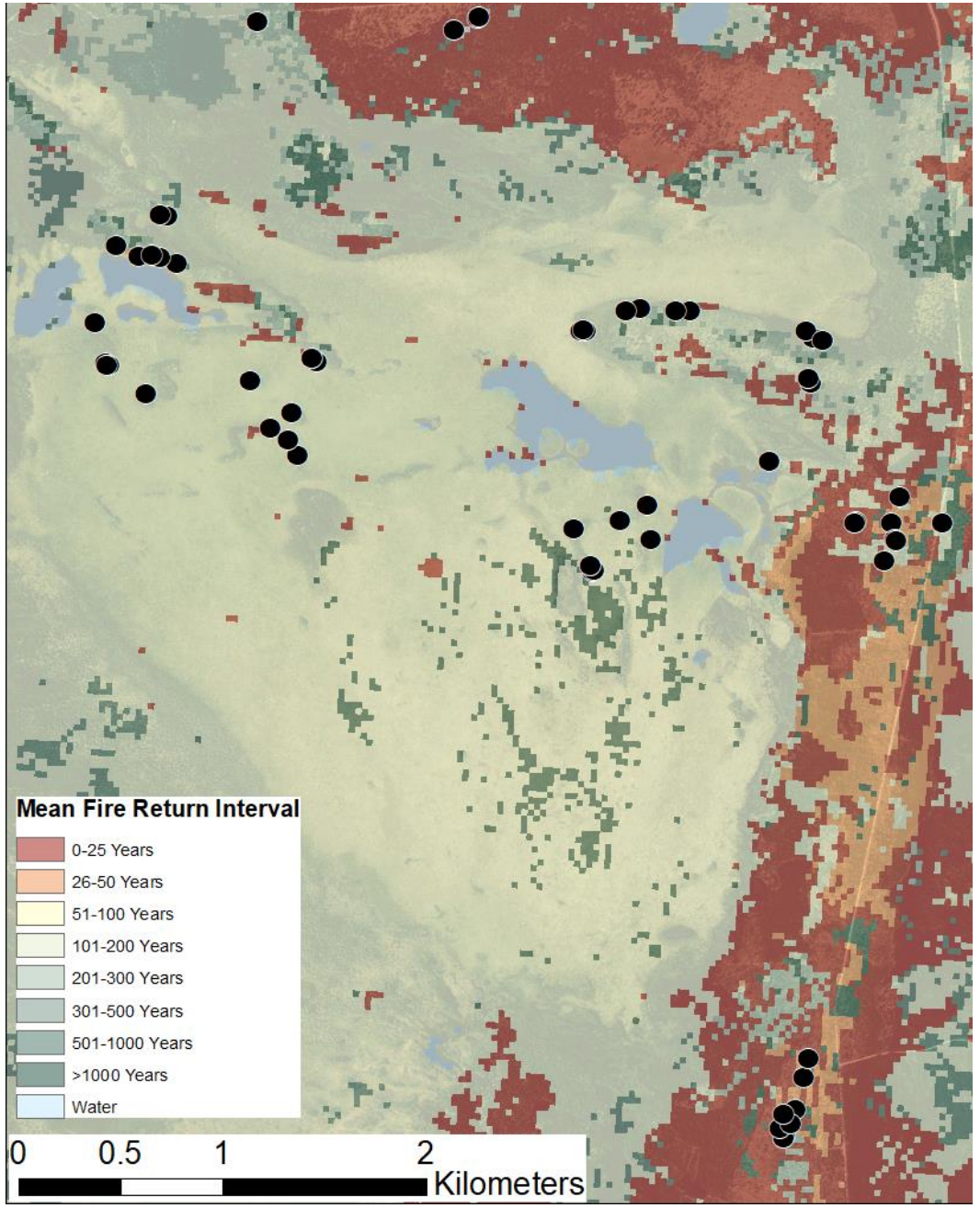
What do three of the largest wildfires in recent Great Lakes history have in common?

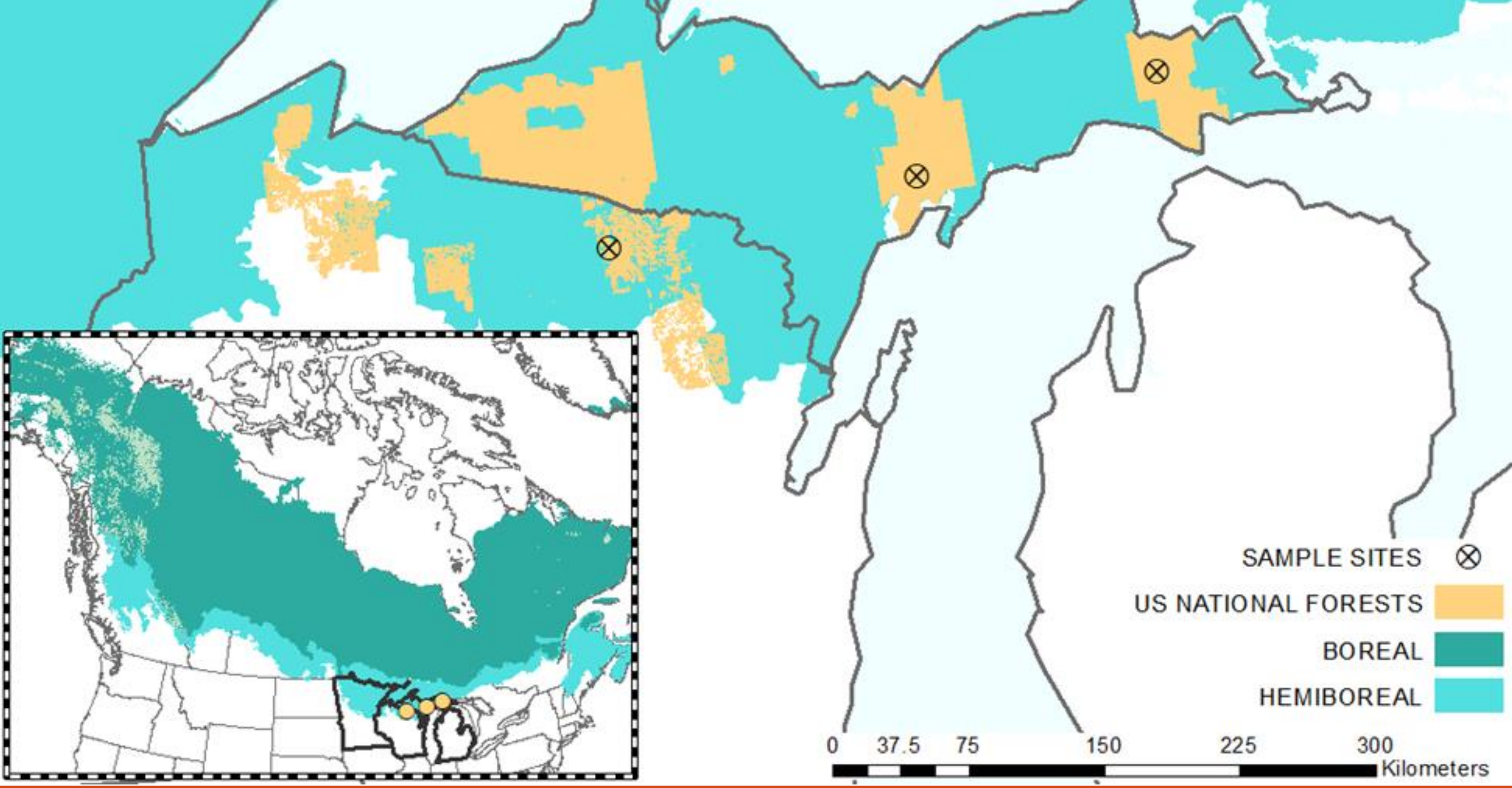
Hiawatha NF/USFS

Where did this fire start?

Mixed messages in mixed landscapes






SAMPLE SITES
US NATIONAL FORESTS
BOREAL
HEMIBOREAL
0 37.5 75 150 225 300
Kilometers

Objectives

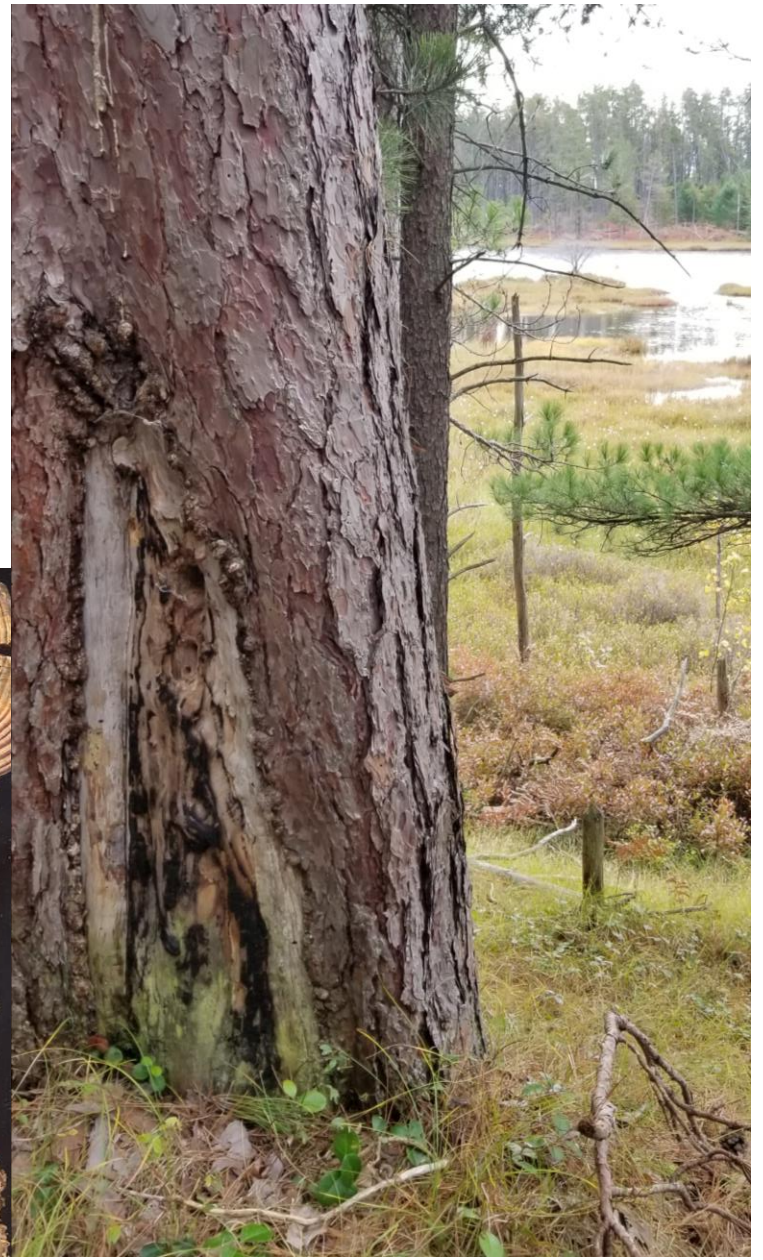
- Determine frequency of low- and moderate- severity fire in Great Lakes' peatlands using tree-rings
- Understand drivers of historical peatland fire regimes
- Compare fire regimes among tree-rings, peat sediments, and lake sediments

Goals

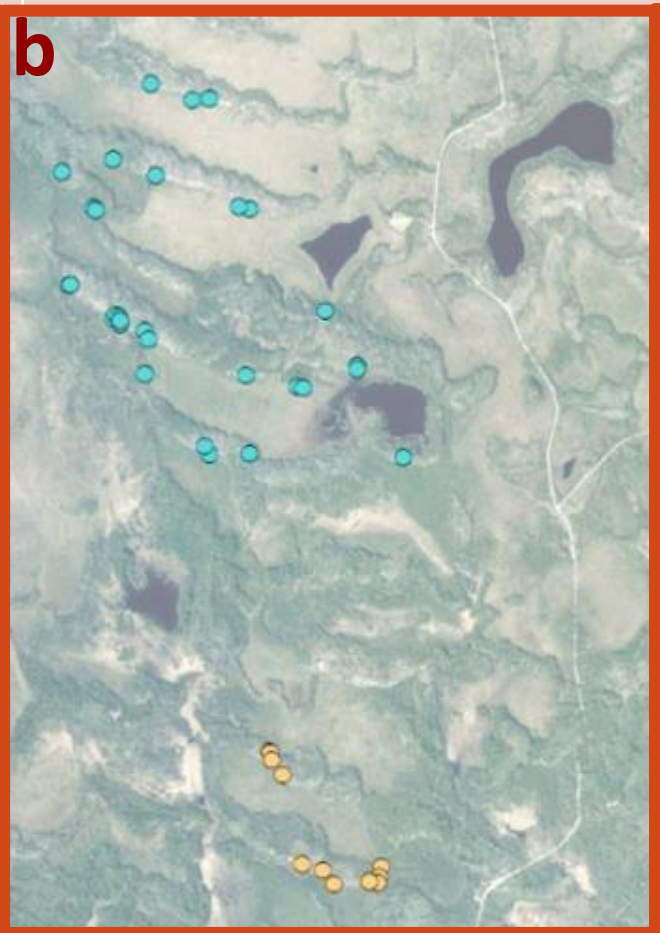
- Characterize historical Great Lakes' peatland fire regimes
- Inform fire management, fire models, and fire risk assessments

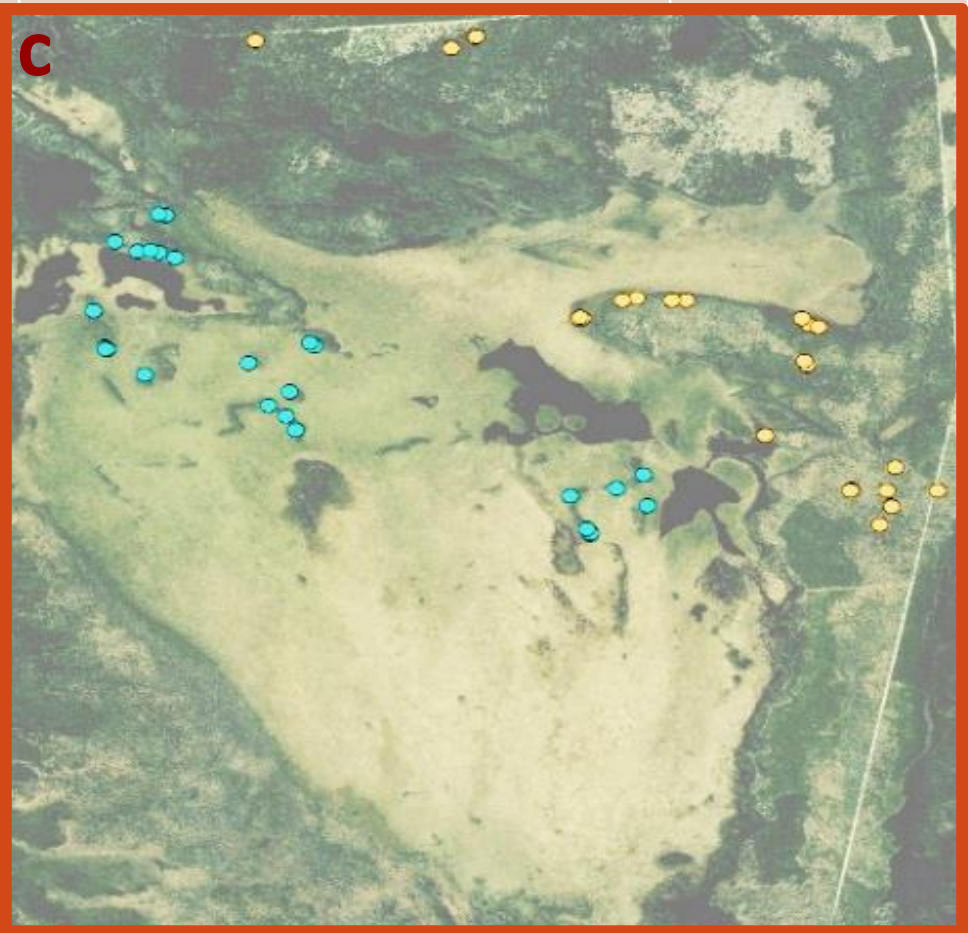
Fire scars and tree-rings

- Identify individual fire events including year and season
- Capture widespread low- and moderate-severity fire
- Record 100s to 1000s years of fire history

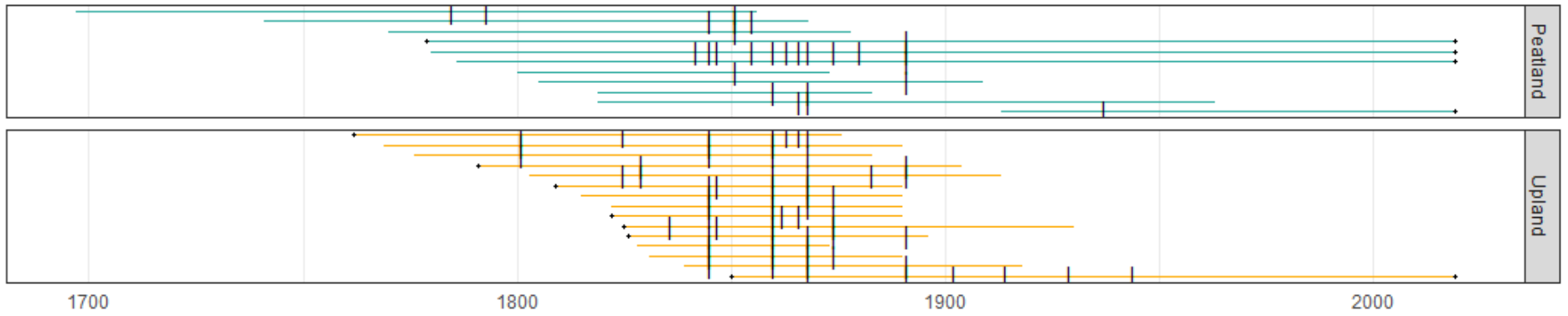


	No. samples	Area sampled (ha)	Minimum Mean Fire Return Interval (yr)	Maximum Mean Fire Return Interval (yr)	Time Span
Haymeadow Flowage (a)	26	82	7	18	1697–2019
Ramsey Lake (b)	41	278	12	25	1570–2018
Betchler Lake (c)	62	1217	9	34	1520–2018



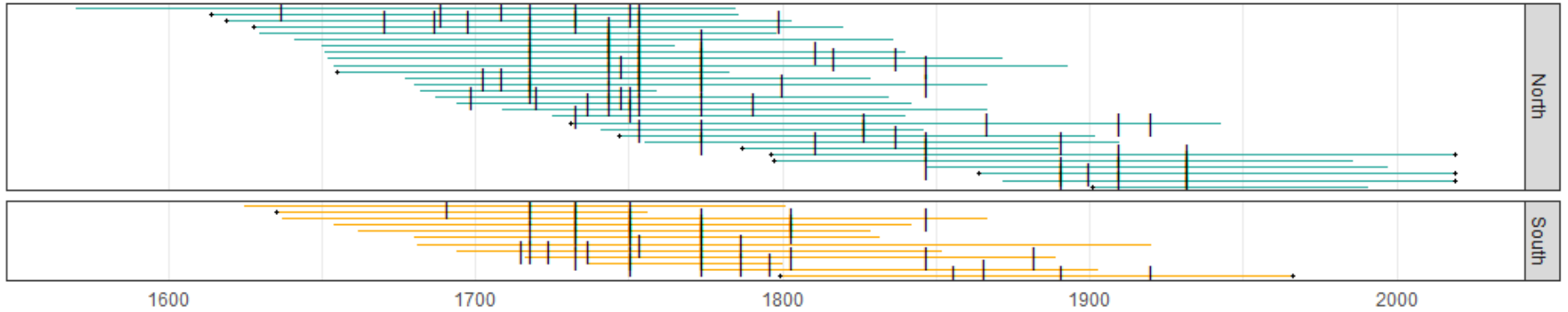


Haymeadow Flowage(a)



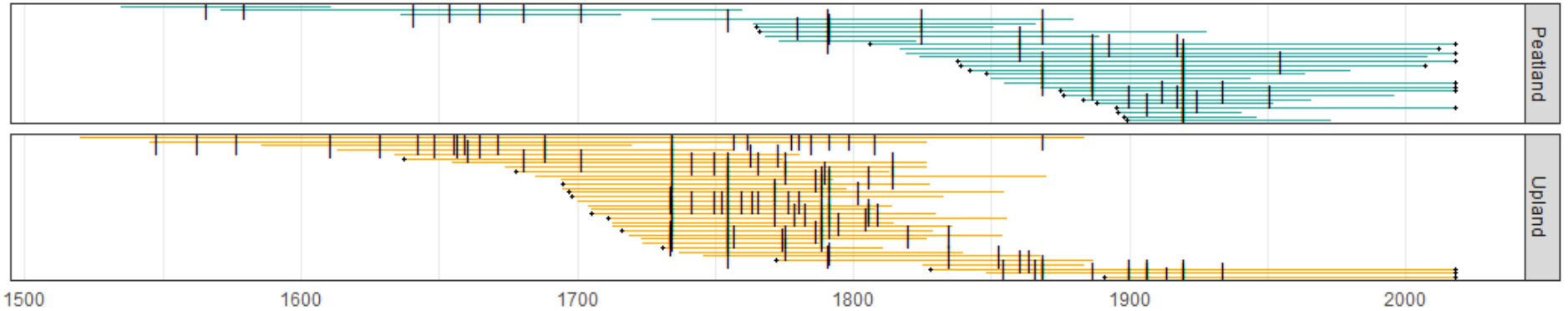
Widespread fire years:
1845, 1847, 1860, 1863, 1866, 1868, 1874, and 1891

Ramsey Lake(b)



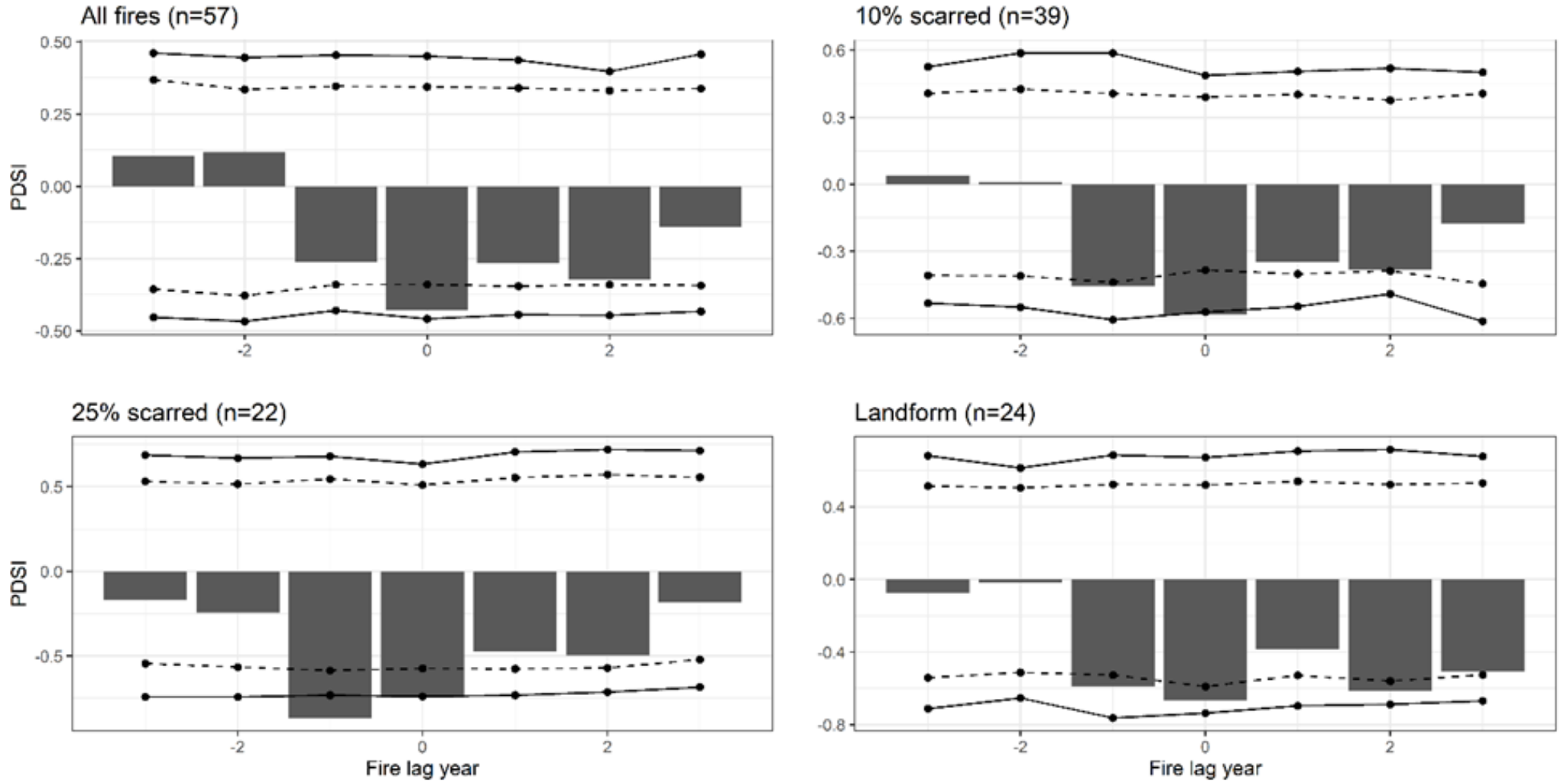
Widespread fire years:
1665, 1681, 1702, 1755, 1791, 1792, 1869, 1887, 1900, 1907, 1920, and 1934

Betchler Lake(c)



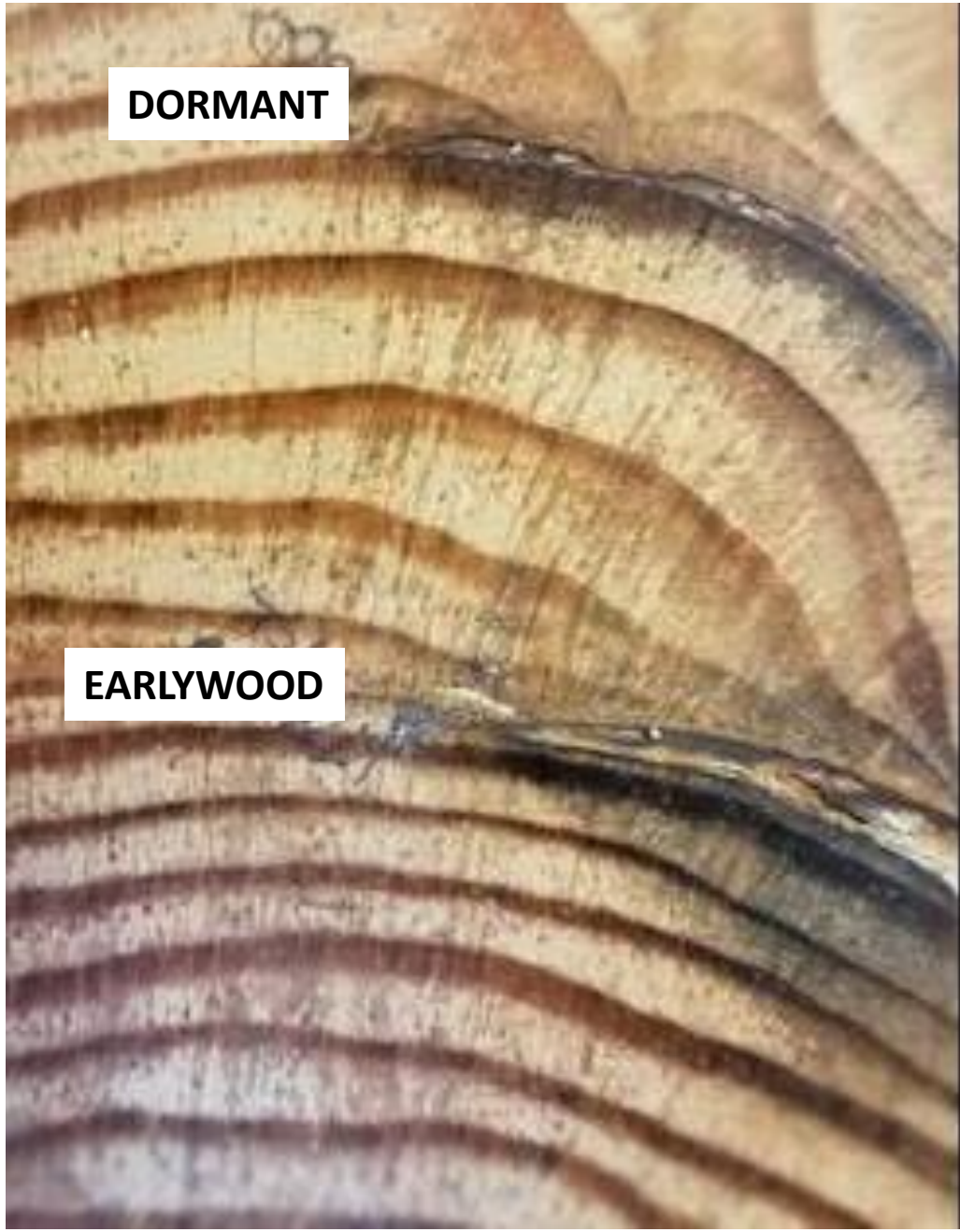
Widespread fire years:
1718, 1733, 1737, 1751, 1754, 1774, 1847, 1891, and 1920

Widespread peatland fires occurred during dry conditions but not severe drought



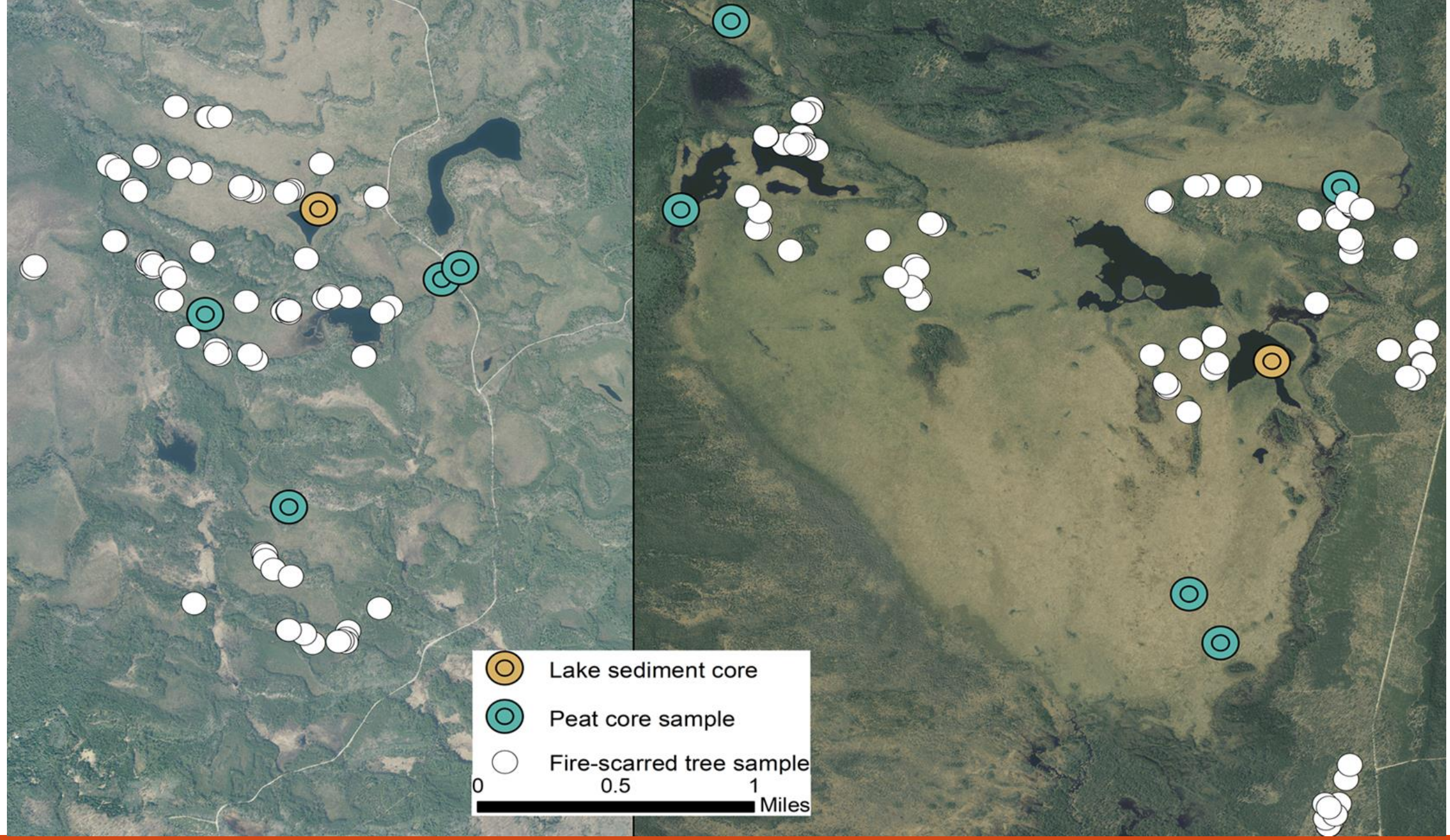
Peatland fires occurred in late summer to early spring

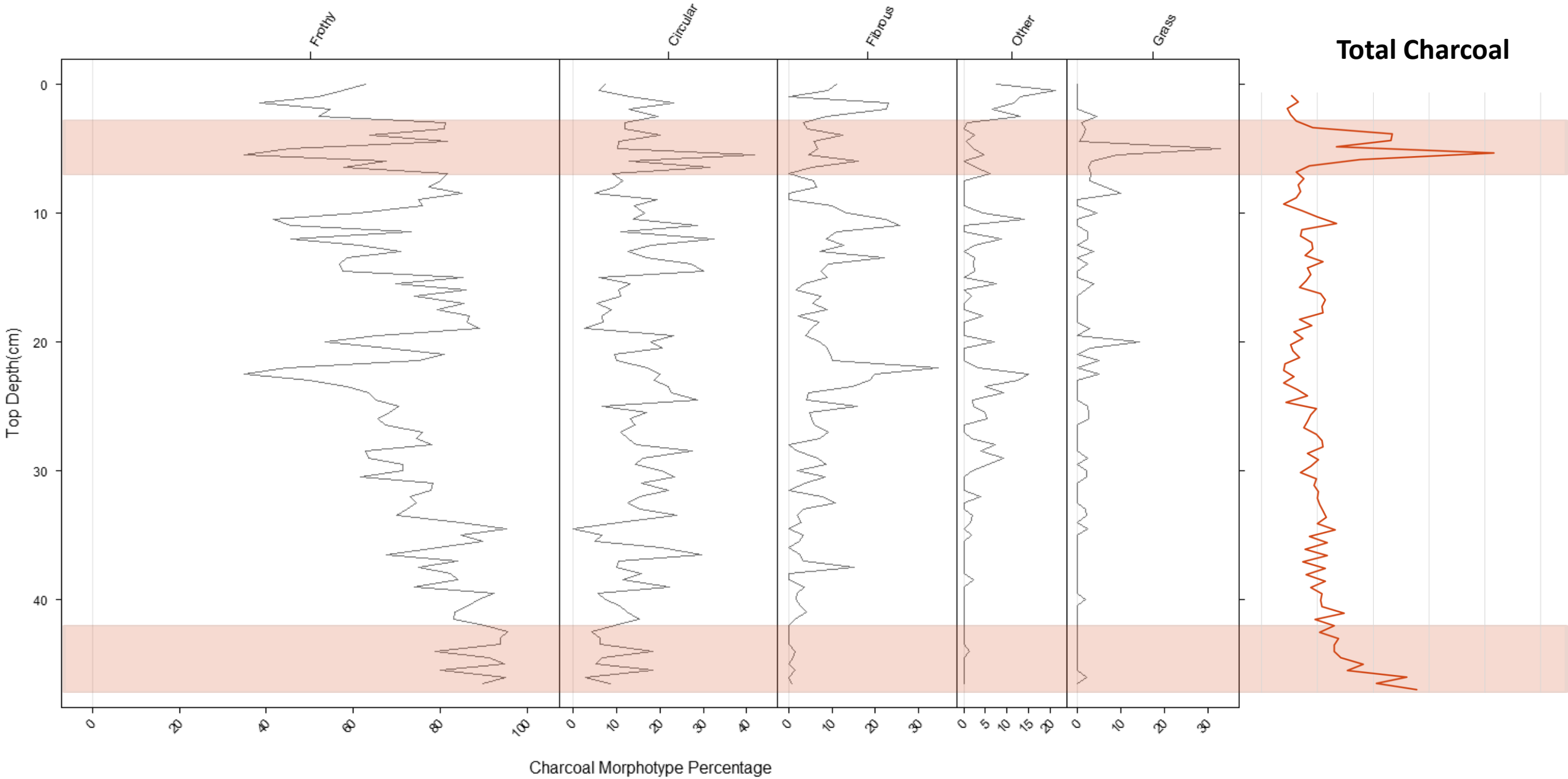
	% Dormant	% Earlywood	% Latewood
Haymeadow Flowage	**88.5**	11.5	0
Ramsey Lake	23.6	8.3	**68.1**
Betchler Lake	**80.8**	0	18.2



Charcoal and sediments

- Identify fire periods not fire events
- Date using radiocarbon and age-depth modelling
- Record 100s to 1000s of years of fire history
- Charcoal type linked to fuel type

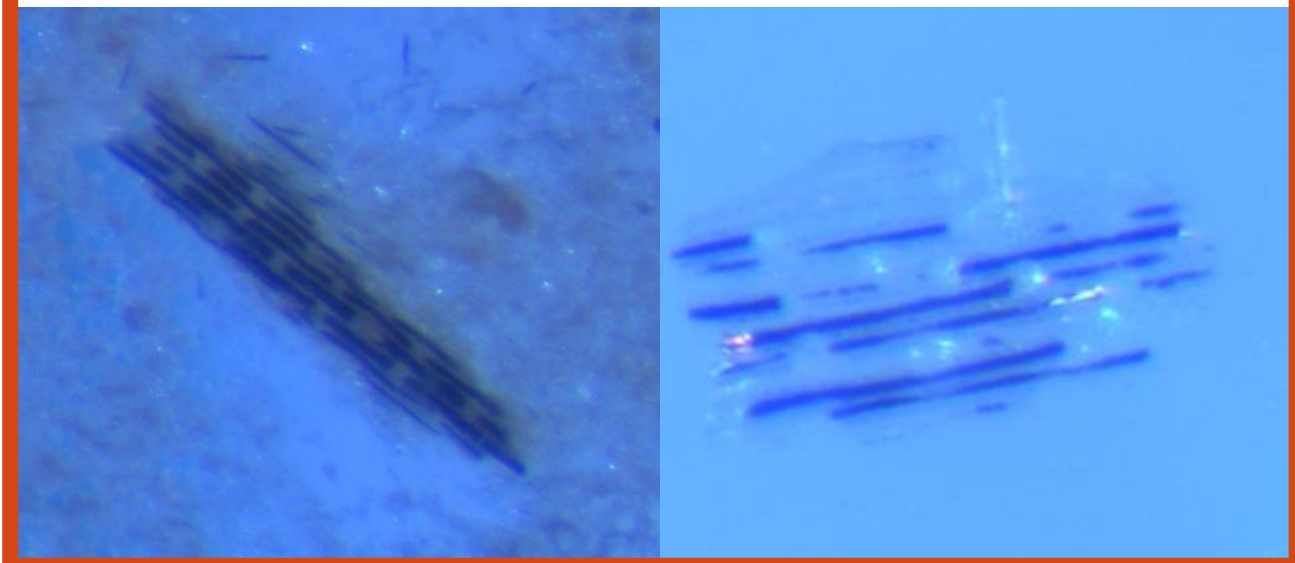

Lake sediment core
Peat core sample
Fire-scarred tree sample
0
0.5
1
Miles


Frothy
Circular
Fibrous
Other
Grass
Total Charcoal
Top Depth(cm)
0
10
20
30
40
0
20
40
60
80
100
0
10
20
30
40
0
10
20
30
0
5
10
15
20
0
10
20
30
Charcoal Morphotype Percentage

Fine fuels burned during fire frequent periods at Betchler Lake

Frothy(Forbs, Pine needles and twigs, grass)

Grass (Big blue stem, Pine twigs, Indian grass)



Fibrous (Pine needles, forbs, grass, Pine wood)

Rethinking peatland fire in the Great Lakes

- **Convention: Fires only burned every 100 to 1000 years, required severe sustained drought, burn from uplands into peatlands**

- **Our findings: Fires burned every 10 years, burned under dry conditions but not drought, widespread across uplands and peatlands**

- **Fire management in peatlands now, determines resilience and conservation of peatlands in future**

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Spatial Analysis for Conservation and Sustainability

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